

What is random???

An outcome is random if we know the possible values it can have, but not which particular values it takes

Also, individual outcomes are uncertain, but there is a pattern in long run trials.

Ex: Flipping a coin

Rolling a die

Drawing a card from a deck, looking at the suit

The gender of a child

Winning the lottery

So how do we generate these random numbers?

TABLE OF RANDOM DIGITS: ✨ Appendix G Die: 1-6 ignore 7,8,9,0

- In book (or given a section on assignments)
- Pick a line to start at, and read across Line 20
- can read by single digits, by 2 digits, by 3 digits, etc.

CALCULATOR:

randInt(1, 30)

1234 → rand

MATH --> PRB --> randInt(lower, upper) --> ENTER

FLIPPING COIN

— H = Boys
T = Girls

ROLLING DIE

SIMULATION = modeling a real world situation by using random digit outcomes.

- * Assign numbers to each outcome (based on the outcome's probability)
- * Use a **random number generator** (table coin, calculator, etc.) to generate these assigned numbers (this will simulate an event happening)
- * **Trial** = each time we simulate an event
- * **Response Variable** = the outcome of the trial
- * Two ways to stop:
 - certain # of trials
 - achieved a certain outcome ("until")

Example: A baseball player gets a hit in 30% of his at-bats.
Simulate him coming to bat 12 times.

1) Identify the outcomes and their probabilities

Hit = 30% Non-hit = 70%

2) Decide on your generator and assign the events to the generator

T.R.D. H = 0-2 = 1-3 = 00-29
N = 3-9 = 4-9, 0 = 30-99

3) What is your response variable? Create a table to record.

Hit/Non

4) Read across the table to simulate one trial. Record results.

Repeat Line 7

5) Stop when.... *completed*
12 trials

Hit	Non
	

Example: Picking a card, and looking at the suit. Simulate 10 picks.

1) Identify the outcomes and their probabilities

Heart = 25% Diamond = 25% Club = 25% Spade = 25%

2) Decide on your generator and assign the events to the generator

TRD

H = 1, 2	Ignore	H = 1	Ignore	H = 01 - 25
D = 3, 4	0, 9	D = 2	0, 5 - 9	D = 26 - 50
C = 5, 6		C = 3		C = 51 - 75
S = 7, 8		S = 4		S = 76 - 99, 00

3) What is your response variable? Create a table to record.

Suit

4) Read across the table to simulate one trial. Record results.

Repeat

5) Stop when... completed 10 trials

Suit	freq.
H	
D	
C	
S	

Example: A certain Stat class consists of 46% males. Simulate the teacher picking 8 students and recording their gender.

1) Identify the outcomes and their probabilities

Male = 46% Female = 54%

2) Decide on your generator and assign the events to the generator

T.R.D.

Male = 00-45

Female = 46-99

3) What is your response variable? Create a table to record.

Gender

4) Read across the table to simulate one trial. Record results.

Repeat

Line 32

5) Stop when... completed 8 trials

Gender	Freq.
m	
F	

Example: A spinner has 4 sections: 50% Red, 13% Blue, 12% Green, 25% Yellow. Simulate spinning the spinner 20 times.

1) Identify the outcomes and their probabilities

(see above)

2) Decide on your generator and assign the events

Red = 00 - 49

Blue = 50 - 62

Green = 63 - 74

Yellow = 75 - 99

Example: Back to the baseball player who gets a hit 30% of the time. Assume he gets on average 3 at-bats per game. Simulate 15 games, recording the number of hits per game.

1) Identify the outcomes and their probabilities

Hit = 30% Non = 70%

2) Decide on your generator and assign the events to the generator

TRD

H = 0-2

Non = 3-9

92207 63527

3) What is your response variable? Create a table to record.

hits/game

4) What is 1 trial?

3 at bats

5) Read across the table to simulate one trial.

Record results. Repeat.

Line 25

6) Stop when... completed 15 trials

# hits	freq.
0	
1	11
2	1
3	

Example: Back to the stat class... it consists of 46% males. A teacher needs to pick a group of 4 students. What is the chance that she gets all 4 males? Simulate this 5 times to make your decision

1) Identify the outcomes and their probabilities

Male = 46% Female = 54%

2) Decide on your generator and assign the events to the generator

TRD M = 00-45

043612 409891 69167 389

F = 46-99

3) What is your response variable? Create a table to record.

males in group of 4

4) What is 1 trial?

selecting 4 students

5) Read across the table to simulate one trial.

Record results. Repeat.

6) Stop when.... 5 trials

# males	freq.
0	1
1	
2	
3	
4	

2
10
20%

Example: Picking a card, looking at the suit. We want to pick cards *until* we get a HEART. On average, how many cards will we need to pick? Do 5 trials.

Heart = 25%

Non = 75%

1) Identify the outcomes and their probabilities

Heart, Diam, Club, Spade = all 25%

2) Decide on your generator and assign the events to the generator

TRD Heart = 00-24

Non = 25-99

3) What is your response variable? Create a table to record.

cards picked

4) What is 1 trial?

until we get a heart

5) Read across the table to simulate one trial. Record results.

Repeat

Line 17

6) Stop when....

5 trials

# cards picked	freq
1	
2	
3	
4	
5	
6	
7	
8+	

$$\bar{X} = \frac{1+1+1+2+4}{5} =$$

Ch. 11 Simulations worksheet

#1:

39634 62349 74088

G = 0-4
B = 5-9

Identify events & their probabilities:

State random generator & assign numbers to events:

One trial =

* Response Variable =

Total # of trials = as many as possible

